Biodegradable Magnetic Nanocomposite Spheres Fabrication by O/O Emulsion/Solvent Evaporation Technique for Drug Delivery Purposes

R. Asmatulu and A. Fakhari
Wichita State University, Wichita, KS

Drug targeting systems are important research areas for many diseases treatments (e.g., cancer, nerve damage, heart and artery, diabetic, eye and other medical treatments). Currently, magnetic field, electric field, ultrasound, temperature, UV light and/or mechanical force systems are considered more for research and development. Magnetic targeted drug delivery system is usually preferred because targeted systems improve the therapeutic index of drug molecules by minimizing the toxic side effects on healthy cells and tissues. In this study, magnetic nanoparticles (~10 nm) were prepared by a chemical coprecipitation of ferric and ferrous chloride salts in the presence of a strong base (ammonium hydroxide) and used for a drug delivery purposes. An oil-in-oil emulsion/solvent evaporation technique was chosen for the synthesis of nanocomposite spheres. Percentages of magnetic nanoparticles (%5, %10, %20 and%30) and poly(D,L-lactide-co-glycolide) were combined together to produce nanocomposite particles with diameters of 500 nm to 1.2 micronmeter. The effect of particle concentrations on nanocomposite particle size and distribution and morphology were investigated by using scanning electron microscopy (SEM) and laser light scattering (LLS). Additionally, external magnetic fields with various magnet distance, magnetic field, pump speed and solid contents were applied to the nanocomposite particles in a liquid media to find out the effect of variables for the targeting of drug carrying nanocomposite spheres.